Study Links Air Pollutants with Autism

Bay Area children with the disorder are 50% likelier to be from areas high in several toxic substances. Scientists say more research is needed.

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Children with autism disorders in the San Francisco Bay Area were 50% more likely to be born in neighborhoods with high amounts of several toxic air contaminants, particularly mercury, according to a first-of-its-kind study by the California Department of Health Services.

The new findings, which surprised the researchers, suggest that a mother's exposure to industrial air pollutants while pregnant might increase her child's risk of autism, a neurological condition increasingly diagnosed in the last 10 years.

But the scientists cautioned that the link they found in the Bay Area is uncertain and that more definitive evidence would be needed before concluding that mercury or any other pollutant could trigger autism.

Gayle Windham, the study's lead researcher and senior epidemiologist in the department's environmental health investigations branch, called it "a single small study" and "a first look" at whether toxic pollutants play a role in the neurological disorder, which is often marked by poor verbal and communication skills and withdrawal from social interaction.

Scientists have long wondered if the surge in diagnoses is due, in part, to environmental causes. Some of the increase comes from growing doctor and parent awareness, but experts say that cannot explain all of it.

"Clearly this suggests that there may be correlations between autism onset and environmental exposures, especially as it relates to metal exposures," said Isaac Pessah, a toxicologist who heads UC Davis' Center for Children's Environmental Health and Disease Prevention. Pessah, who was not involved in the study, is also a researcher at the university's MIND (Medical Investigation of Neurodevelopmental Disorders) Institute, which studies autism.

"It would be prudent to reserve judgment until we see if this study can be replicated and whether it's of general significance" by looking for the same link outside the Bay Area, he said.

About 300,000 U.S. children have been diagnosed with autism and often need

special education. The study compared 284 children from six Bay Area counties who were diagnosed as having so-called autism spectrum disorders — which include a less-severe syndrome called Asperger's — with 657 children from the same counties without the disorders. All were born in 1994.

The scientists reviewed data for 19 hazardous air pollutants that are known or suspected neurotoxins: chemicals that have a toxic effect on the brain.

They found that the children with the autism disorders were 50% more likely than the non-autistic children to be born in areas with higher estimated levels of three metals and two chlorinated solvents: mercury, cadmium, nickel, trichloroethylene and vinyl chloride. No significant link was found with 14 other solvents and metals, including compounds such as lead, benzene and chromium.

The national autism rate is six children per 1,000, so a 50% increase would elevate that rate to nine per 1,000.

The biggest increase came with heavy metals including mercury, a pollutant from power plants, factories and mines that can disrupt brain development.

The Bay Area was chosen for the study because extensive data are readily available there because of a federally funded program to count and track autistic children. The region's toxic air pollution is considered typical for urban areas.

San Francisco County had the highest estimated levels of metals and solvents, including mercury, and Marin County had the lowest of those studied. But the researchers did not compare autism prevalence by county.

In their report, published online Wednesday in the journal Environmental Health Perspectives, the authors said their research "suggests that living in areas with higher ambient levels of hazardous air pollutants, particularly metals and chlorinated solvents, during pregnancy or early childhood, may be associated with a moderately increased risk of autism. These findings illuminate the need for further scientific investigation, as they are biologically plausible but preliminary and require confirmation."

The study is the first to look for a connection between autism among children and levels of hazardous air pollutants at birth. Last year, scientists who compared volumes of industrial mercury emissions in Texas with autism in schoolchildren reported a similar link.

Autism is believed to start in the womb, early in pregnancy, when the brain develops. Genetic factors determine who is susceptible, but experts theorize that environmental factors contribute.

The new study found that mercury was the "most significant correlation with

autism," Pessah said, "but every family may not be affected the same way because of their genetic makeup."

Many parents of autistic children blame vaccines that contained a type of mercury called thimerosal. Expert reviews have found no link between vaccines and autism, but some scientists do not consider them definitive.

No assumptions about vaccines can be made on the basis of the air pollution study. "Mercury in the air is a different type than in vaccines," Windham said.

The new study examined elemental mercury, which is released into the air from coal-burning power plants, chlorine factories and gold mines. It spreads globally and builds up in food chains, particularly in oceans. Levels of mercury are increasing in many parts of the world, largely from power plants in China and India.

The researchers had not expected to be able to discern a relationship between autism and the air pollution data.

The five metals and solvents are common industrial pollutants, but air is only one source of exposure, because they also contaminate water and food.

Some experts say that if there is a link between mercury and autism, it most likely comes from fish consumption, the main route of mercury exposure. A 20-year, ongoing study in Denmark's Faroe Islands has shown that children have slightly reduced intelligence when mothers consumed excessive mercury in seafood.

The largest limitation or uncertainty in the Bay Area study is that the pollution data did not come from measurements of compounds to which the mothers were actually exposed. Instead, they were based on estimates calculated by the U.S. Environmental Protection Agency using computer modeling of industrial emissions.

Windham said that "there could be other explanations" for the link they found. For example, it could be that women who live in the worst-polluted areas also smoke more or eat more contaminated seafood. The scientists did not track down the mothers to compare lifestyles.

Researchers at Johns Hopkins University's School of Public Health are conducting a similar study in the Baltimore area to see if they replicate the findings.